



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:  
**18.11.2009 Bulletin 2009/47**

(51) Int Cl.:  
**E05B 47/00<sup>(2006.01)</sup>** **E04D 13/035<sup>(2006.01)</sup>**  
**E05F 15/04<sup>(2006.01)</sup>**

(21) Application number: **09100283.2**

(22) Date of filing: **15.05.2009**

(84) Designated Contracting States:  
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO SE SI SK TR**

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(30) Priority: **15.05.2008 PL 38519808**

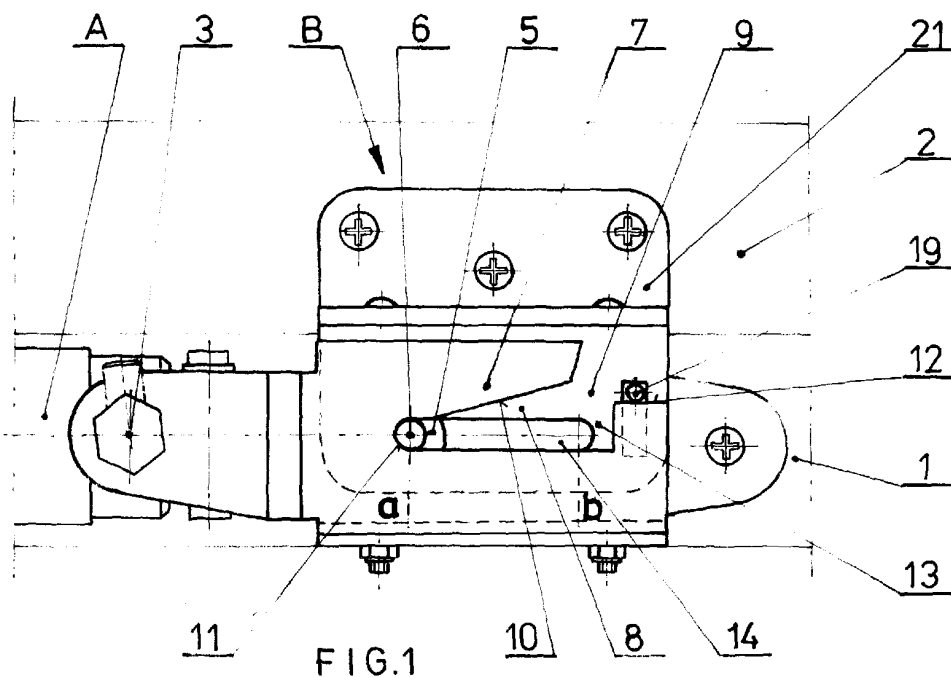
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(54) **A device for remote leaning out and locking in the closed position of a mobile frame, in particular a smoke flap**

(57) The device consists of a linear actuator (A) and a lock (B). The linear actuator (A) is connected with a stationary (3) and a mobile (5) articulated joint between a stationary frame (1) and a mobile frame (2) in the plane perpendicular to the axis of inclination of the mobile frame (2). The lock (B) comprises a stationary member (7) and a mobile member (13) secured respectively to both frames (1, 2) and interlocked in the closed position by a bolt (6) controlled mechanically by the linear actuator movement at the final section of its stroke. The bolt (6) of the lock (B) constitutes a pin of the mobile joint (5).

moved by the linear actuator (A) in the guide (14) made in the mobile member (13). The mobile member has a spring (14) loaded pawl (15) holding the bolt (6) in the extreme outer point (b) of the guide (14), having also a releasing mandrel (19), which cooperates with the bumper (12) of the stationary member (7) by lifting the pawl (15) and releasing the bolt (6) during the holding down and locking phase of the mobile frame (2) and during mounting the bolt (6) in the socket (11) of the stationary member (7) in the extreme inner point (a) of the guide (14).



## Description

**[0001]** The present invention concerns a device for remote leaning out and locking in the closed position of a mobile frame, in particular a smoke flap. The device may also be used as a fitting of other mobile barriers of openings in civil engineering structures, in particular of window sashes or door leafs.

**[0002]** Many solutions of devices for remote moving and locking a mobile frame in relation to a stationary frame are known. For instance, the solutions presented in Polish patent descriptions PL - P-378793 and PL-P-368265 concerning roof smoke flaps have a linear actuator build in an articulated way between the stationary and the mobile frame of the cover. Most often a piston-type pneumatic actuator or a motor-screw actuator is used as the linear actuator cylinder. Its operation is initiated by a smoke or temperature detector signal.

Moreover, these devices have a lock holding the mobile frame in the closed position, comprising a stationary and a mobile member connected respectively to both frames. The lock has a bolt mechanically controlled by the movement of the linear actuator in the final section of its stroke. The bolt constitutes a mobile catch coupled with a stationary catch in the final phase of the stroke after the mobile frame is closed and opened out in the initial phase of its opening.

**[0003]** A solution of a mobile frame lock, for pressing the door leaf down to the closed position and locking it in this position is also known from the European patent application description EP 1816292. The lock has a linear actuator rigidly secured in the stationary frame plane and driving the bolting component of the mobile member. This bolting component can be a pin-type bolt or a component with a recess having an entry, a pressure wedge and a locking socket. After the mobile frame is properly closed into the position where the bolt is inside the recess the linear actuator operation causes movement of one of these components perpendicular to the inclination direction - resulting in pressing down and locking the mobile frame to the stationary frame. The solution's only function is the lock for the closed position, the mobile frame must be leaned out manually or with another means of propulsion.

**[0004]** The device according to the invention has also a linear actuator connected by articulated joints between the stationary and the mobile frame in the plane perpendicular to the axis of inclination of the mobile frame, and a lock comprising a stationary member and a mobile member, both secured respectively to the both frames and interlocked in the closed position by a bolt mechanically controlled by the linear actuator movement in the final section of its stroke.

The essence of the invention consists in that the lock bolt constitutes a pin of a mobile articulated joint moved by the linear actuator in the guide of this member. The mobile member has a spring-loaded pawl, holding the bolt in the extreme outer guide point. In addition, the mobile

member has a releasing mandrel, which cooperates with the bumper of the stationary member by lifting the pawl and releasing the bolt during the pressing down and locking phase of the mobile frame and during mounting the bolt in the socket of the stationary member in the extreme inner guide point.

**[0005]** In a solution like this the bolt is locked in two characteristic positions: when the mobile frame is closed - in the stationary member recess socket, and during opening and closing of the mobile frame - in the extreme outer point of the mobile member guide, caught with the pawl.

It is advantageous when the stationary member and the mobile member of the lock have the form of "C" cross-section channels facing each other with their flanges. The mobile member's width is narrower than the internal span of the stationary member flanges. The guides are made in the flanges of the mobile member, and the lock recess with the entry, the pressure wedge and the bolt socket are made in the stationary member flanges. The bolt's length is not shorter than the width of the stationary member flanges. The solution ensures stiffness of the lock resulting from symmetry of the operating forces.

**[0006]** The linear actuator used in the device is advantageously electromagnetically, pneumatically or hydraulically driven.

**[0007]** It is also advantageous if the stationary member and the mobile member are secured to the sides of the stationary frame and the mobile frame with a stationary bracket and a mobile bracket, and the linear actuator in its closed position is placed parallel to the stationary frame.

**[0008]** The linear actuator application, where the stationary articulated joint is located at the front head, at the execution component side and is mounted in the elongated flanges of the stationary member, gives the device a compact design with simple construction.

**[0009]** The solution according to the invention is shown in embodiment examples in the drawing. Fig. 1 shows a fragment of the front view of the connection of the linear actuator to the lock in the closed mobile frame position, fig. 2 shows the longitudinal vertical cross-section through the lock in the closed position according to the line A-A marked in the fig. 3, fig. 3 shows the vertical cross-section through the lock in the closed position, according to the B-B broken line marked in the fig. 2, fig. 4 shows the vertical cross-section through the lock in the initial phase of opening and the final phase of closing of the mobile frame, whereas fig. 5 shows individual components of the lock in the perspective exploding view.

**[0010]** The device consists of two units: the linear actuator A, in this embodiment it is a piston-type pneumatic cylinder and the lock B, of which the stationary member 7 and the mobile member 13 are secured respectively to the stationary frame 1 and the mobile frame 2. The mobile frame 2 is connected to the stationary frame 1 through hinges not shown in the picture, which are located at the left hand side, behind the linear actuator A.

**[0011]** The linear actuator A is mounted with the stationary articulated joint 3 on the front head in the fork of the stationary member 7, which in turn is connected to the stationary frame 1 by the stationary bracket 22. The executive component 4 of the pneumatic linear actuator A is a piston rod connected to the mobile frame 2 by the mobile articulated joint 5. The axes of articulated joints 3 and 5 enable leaning out of the linear actuator A in the plane perpendicular to the axes of mobile frame 2 hinges, the plane coinciding with the plane marked as A-A in fig. 3. The pin of the mobile articulated joint 5 with protruding ends symmetrically elongated to both sides at the same time acts as the bolt 6 in the lock B.

**[0012]** The stationary member 7 and the mobile member 13 of the lock B are bent from metal sheet into the form of "C" channels. The flanges of units 7 and 13 face each other, and the width of the mobile member 13, which is smaller than the internal span of the flanges of the stationary member 7, enables to insert it between the stationary member 7 flanges. Grooves constituting the rectilinear guides 14 are made in the flanges of the mobile member 13, whereas the recesses 8 of the right-angled triangle shape are cut in the flanges of the stationary member 7. The hypotenuse of the triangle constitutes the pressure wedge 10, its top vertex is cut vertically to the upper edge with the entry 9 and the bottom vertex is ended with the horizontal socket 11 of the bolt 6. The length of the bolt 6 is longer than the width of the stationary member 7, thus its ends cooperating at the same time with the guides 14 and the recesses 8 couple the stationary member 7 with the mobile member 13 of the lock B. The length of the guide 14 is slightly longer than the dimension between the extreme inner point a and the extreme outer point b of the bolt 6 position.

**[0013]** Dimensions and relative location of the stationary member 7 and the mobile member 13 ensure that the bolt 6 mounted in the socket 11 in the position "a" does not abut the end of the guide 14, while in the position "b" the bolt 6 resting against the end of the guide 14 does not contact the vertical wall of the recess 8 of the stationary member 7.

**[0014]** Inside the mobile member 13 there is a single lever or the pawl 15, at the one end it is supported with the axle 16 in the flanges of the mobile member 13 and at the other end it has a crosswise releasing mandrel 19. The length of the releasing mandrel 19 is equal to the width of the channel of the stationary member 7 and its ends are lead outside through the backup grooves 20 made in the flanges of the mobile member 13. The bolt catch 18 is made near the lever end with the releasing mandrel 19

**[0015]** The pawl 15 is loaded with the spiral spring 17, mounted with its one end at the pawl stud 15 and with the other one in the mobile member 13 aperture. The ends of the releasing mandrel 19 in the final phase of closing the mobile frame 2 rest against the bumpers 12 of the stationary member 7, raising the pawl 15 over the guide 14 clearance and releasing the bolt 6 from the catch

18.

**[0016]** In the closed position of the mobile frame 2, shown in fig. 1, 2 and 3, the bolt 6 is locked in the socket 11, and at the same time it presses down the mobile frame 2 through the guide 14 to the stationary frame 1. The control system signal initiating ejection of the executive component 4 of the linear actuator A causes the bolt 6 to leave the socket 11 and to move along the guide 14 inside the recess 8. The mobile member 13, under the influence of the spring 17 is pushed away by the releasing mandrel 19 from the stationary member 7, which determines the movement of the bolt 6 along the guide 14 and at the same time along the pressure wedge 10 towards the open entry 9 of the recess 8. After the extreme outer point "b" of the guide 14 is reached by the bolt 6, the coupling of the lock B members disappears and the bolt 6 gets connected with the mobile member 13 by locking with the catch 18 of the pawl 15 from the rear. Further movement of the executive component 4 of the linear actuator A causes leaning out of the mobile frame 2 up to the full opening, determined by the full actuator stroke.

**[0017]** During closing of the mobile frame 2 the operations described above proceed in the reverse order. Having reached the position shown in fig. 4, further retracting of the piston rod causes raising of the pawl 15 as a result of resting of its releasing mandrel 19 against the bumper 12 of the stationary member 7. The released bolt 6 is entered through the entry 9 to the recess 8 and its further retracting is determined by simultaneous sliding against the guide 14 of the mobile member 13 and the pressure wedge 10 of the recess 9 of the stationary member 7. It results in pressing the mobile frame 2 down to the stationary frame 1 ended in the extreme inner point "a" by locking of the bolt 6 in the socket 11.

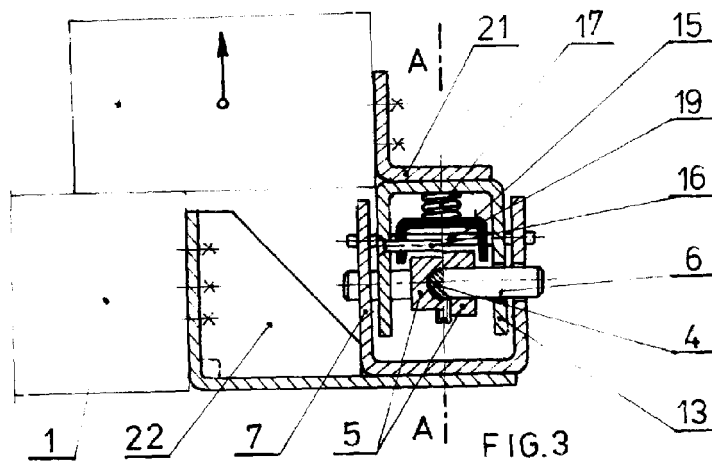
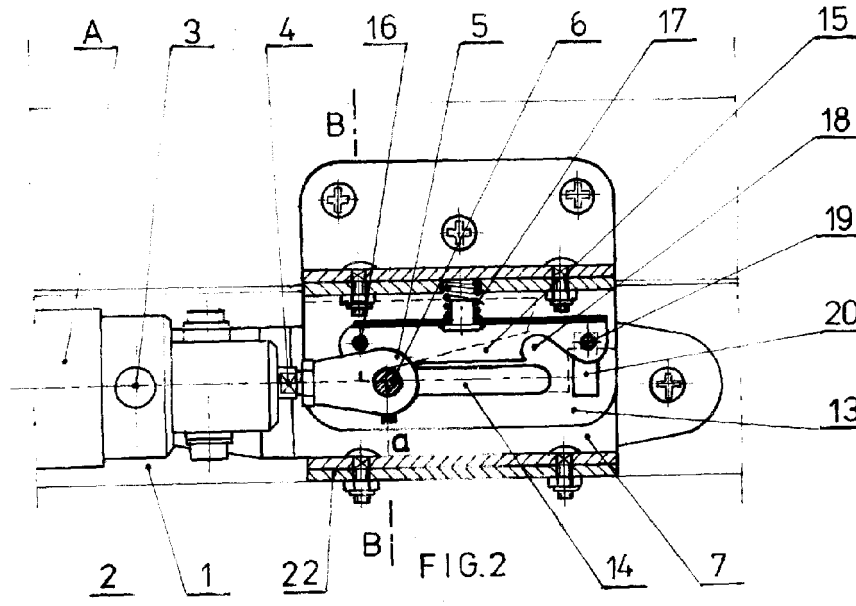
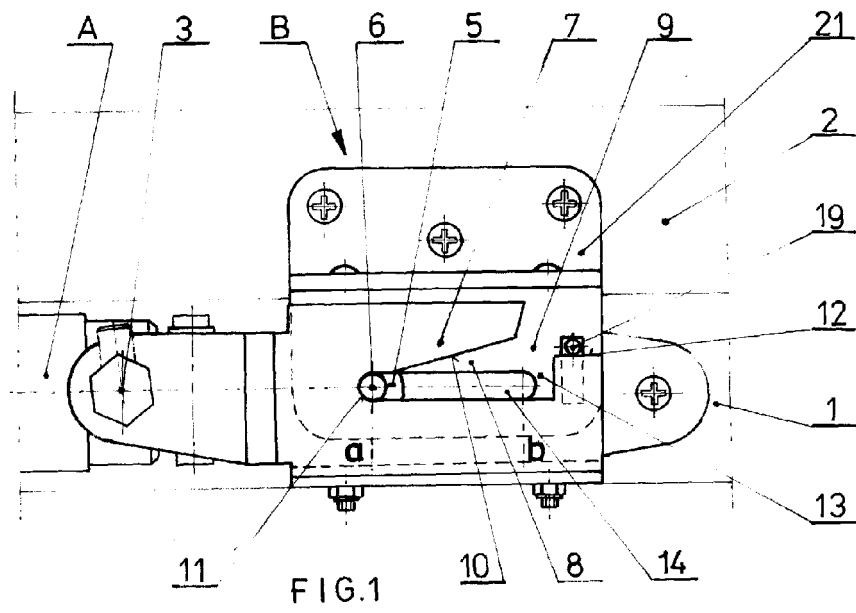
**[0018]** It is obvious that the device can be used if it is secured to the frames in other way than with brackets 21 and 22 described above, used when hinges perpendicular to the axis are fastened to the adjacent frame sides. Middle location, for instance for a smoke flap, of the linear actuator A and both members of the lock B fastening in the symmetry plane of the frames, perpendicular to the inclination axis - requires application of different supporting components.

### Claims

1. A device for remote leaning out of a mobile frame and locking it in the closed position, in particular a smoke flap, having - a linear actuator secured with articulated joints between the stationary frame and the mobile frame in the plane perpendicular to the axis of mobile frame inclination and - a lock, comprising a stationary member and a mobile member, secured respectively to the both frames and interlocked in the closed position by a bolt mechanically controlled by the linear actuator movement at the

final section of its stroke **characterized in that** the bolt (6) of the lock (B) constitutes a pin of the mobile articulated joint (5) moved by the linear actuator (A) in the guide (14) made in the mobile member (13), which has a pawl (15) loaded with a spring (14) holding the bolt (6) in the extreme outer point (b) of the guide (14) and also has a releasing mandrel (19), which cooperates with a bumper (12) of the stationary member (7) by raising the pawl (15) and releasing the bolt (6) during the pressing and locking phase of the mobile frame (2) and mounting the bolt (6) in the socket (11) of the stationary member (7) in the extreme inner point (a) of the guide (14).

2. The device as claimed in claim 1 **characterized in that** the stationary member (7) and the mobile member (13) of the lock (B) have a form of "C" channels facing each other with their flanges, and the width of the mobile member (13) is narrower than the internal span of the stationary member (7) flanges, moreover the guides (14) are made in the mobile member (13) flanges and the lock recess (8) with its entry (9), the pressure wedge (10) and the bolt (6) socket (11) are made in the stationary member (7) flanges, in addition the bolt's (6) length is not shorter than the width of the stationary member flanges (7).
3. The device as claimed in claim 1 **characterized in that** the linear actuator (A) is electromagnetically, pneumatically or hydraulically driven.
4. The device as claimed in claim 1 **characterized in that** the stationary member (7) and the mobile member (13) are secured to the sides of the stationary frame (1) and the mobile frame (2) with a stationary bracket (22) and a mobile bracket (21) and the linear actuator (A) in its closed position is placed parallel to the stationary frame.
5. The device as claimed in claim 1 **characterized in that** the stationary articulated joint (3) of the linear actuator (A) is located at the front head, at the side of the executive component (4) and secured in the elongated flanges of the stationary member (7).



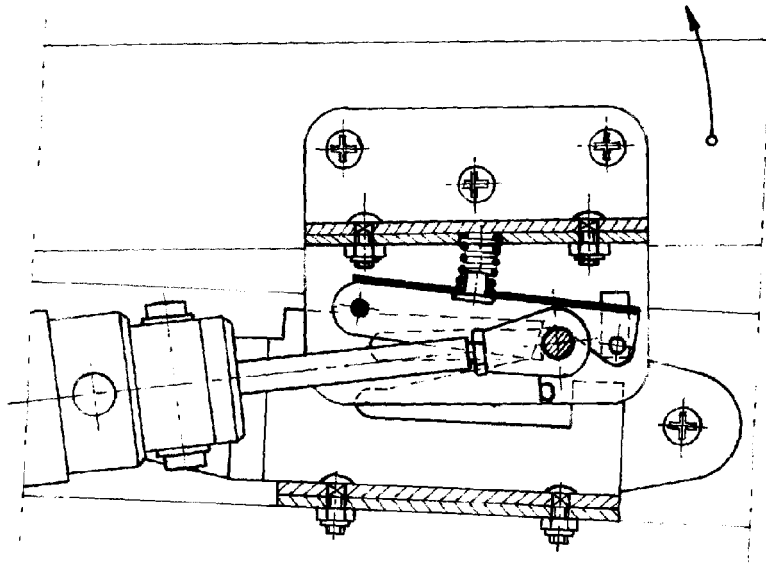


FIG. 4

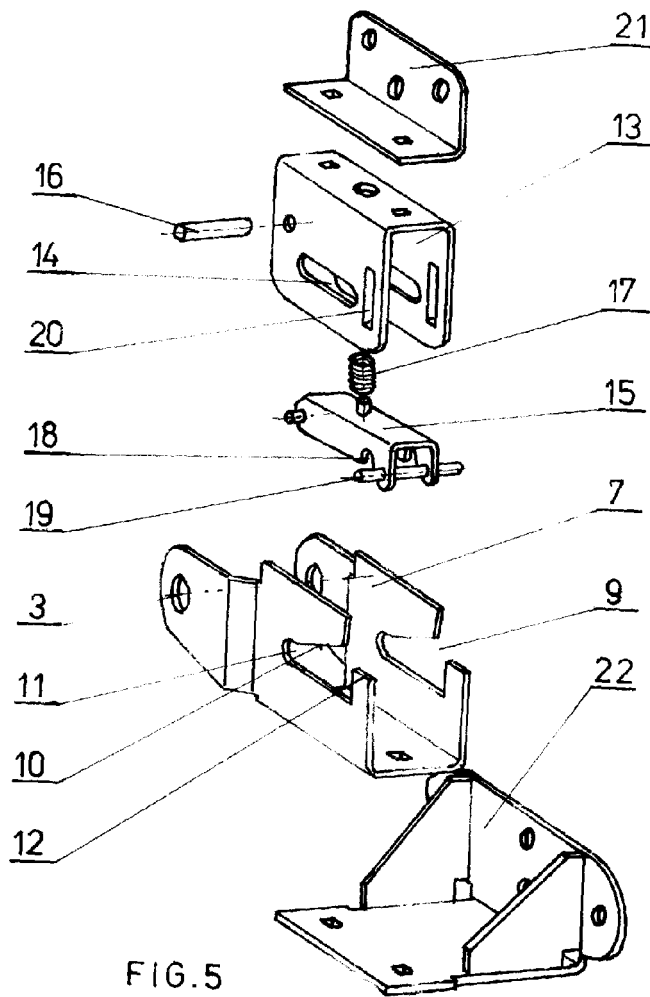


FIG. 5



EUROPEAN SEARCH REPORT

Application Number  
EP 09 10 0283

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	DE 299 21 488 U1 (SCHÜCO INT KG) 24 February 2000 (2000-02-24) * the whole document * -----	1	INV. E05B47/00 E04D13/035 E05F15/04
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			E05F E04D E05B
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		19 August 2009	Van Beurden, Jason
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**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 09 10 0283

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19-08-2009

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EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

**REFERENCES CITED IN THE DESCRIPTION**

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- EP 1816292 A [0003]